

29. (Amended) The apparatus of Claim 21, wherein the at least one aperture connecting the inner conduit and the outer surface is at a forward angle relative to the longitudinal axis of the needle.
30. (Amended) The apparatus of Claim 29, wherein the at least one aperture is at an angle of about 50° to about 130° relative to the longitudinal axis of the needle.
31. (Amended) The apparatus of Claim 21, wherein the needle has a first portion from the proximal end to a shoulder point, wherein said outer surface of said first portion has a first taper, and a second portion from the shoulder point to the distal end, wherein said second portion has a second taper which is substantially greater than the first taper.
33. (Amended) The apparatus of Claim 31, wherein the at least one aperture is located between the shoulder point and the proximal end.

#### REMARKS

Claims 1-33 are presently pending.

#### Rejections under 35 U.S.C. § 112, Second Paragraph

Claims 1, 11-15, 29-30, 33 were rejected by the Examiner under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. More specifically, the Examiner states that for Claim 1, lines 16-17, and 22, "at least one of the apertures" should be changed to --the at least one aperture-- to avoid lack of antecedent basis. Furthermore, for Claims 11-15, 29-30, 33, the Examiner states that all line 1 except Claim 15 which is line 2, "the one or more apertures" should be changed to --the at least one aperture-- to avoid lack of antecedent basis.

The claims have been amended in accordance with the Examiner's suggestions. It is respectfully believed that all claims now fully comply with 35 U.S.C. § 112, second paragraph.

Rejections under 35 U.S.C. § 102

The Examiner rejected Claims 1-2, 5-13, 18-19, 21-22, and 24-30 under 35 U.S.C. § 102(b) as being anticipated by Hendrixson et al. (U.S. Patent 4,103,456).

Independent Claims 1, 18, and 21 have been amended herein, and are believed to patentably distinguish over Hendrixson et al. More particularly, the claims have been amended to note that a portion of the fluid in the fluid reservoir is injected by motion of at least one piston actuated by at least a portion of the gas from the gas reservoir. Applicants have amended the specification to more clearly describe the apparatus. No new material has been added. Support for the claim limitations and the amendments to the description is clearly found at least on page 8, lines 15-16, and Figures 5 and 6 of the originally filed specification.

In the embodiment of Figure 5 of the present application, the compressed gas in tank 90 is used to actuate power piston 80 to the right to impinge upon working piston 82 which drives the fluid that is in a fluid chamber adjacent to the injection needle 86 therethrough to inject the fluid into the plant. In the embodiment of Figure 6, the compressed gas flows through the inlet port 101 and actuates the power piston 125 to the right to thus move injector rod 130 to force the fluid that is in the chamber in front of the injector rod through the injection needle 150 and thus into the plant.

It is respectfully submitted that Hendrixson et al. fail to teach or suggest the use of at least one piston that is actuated by compressed gas to inject fluid into the plant. The aerosol or pressurized can 34 of Hendrixson is used to inject the fluid through passageways 27 when valve 26 is opened.

Accordingly, it is respectfully submitted that independent Claims 1, 18, and 21 patentably distinguish over Hendrixson et al. Therefore, the respective dependent claims also include the patentable limitations and thus distinguish over Hendrixson et al.

Rejections under 35 U.S.C. § 103

The Examiner rejected Claims 3, 4, 14, and 23 under 35 U.S.C. § 103(a) as being unpatentable over Hendrixson et al.

As noted above, it is respectfully submitted that the independent claims patentably distinguish over Hendrixson et al. Claims 3, 4, and 14 depend directly or indirectly from independent Claim 1 and thus include the patentably distinction thereof. Claim 23 depends directly from Claim 21 and thus includes the patentable distinction as noted above. Accordingly, this rejection is believed to be overcome.

The Examiner rejected Claims 15-17, and 31-33 under 35 U.S.C. § 103(a) as being unpatentable over Hendrixson et al. in view of Schoonman (U.S. Patent 3,295,254). As noted above, the independent claims of the present application, as amended, are believed to patentably distinguish over Hendrixson et al. In particular, the claims have been amended to recite at least one piston actuated by a compressed gas to inject the fluid into the plant.

It is respectfully submitted that Schoonman fails to remedy this deficiency. Schoonman is directed to an apparatus used to inject liquid into trees. The fluid container 34 encloses a fluid to be injected into the tree via injection nozzle 10. The fluid container 34 is not pressurized and the fluid is gravity fed into the tree. It is respectfully submitted that Schoonman does not disclose use of a piston actuated by a compressed gas to inject fluid into a tree. Accordingly, this rejection is believed to be overcome.

The Examiner rejected Claim 20 under 35 U.S.C. § 103(a) as being unpatentable over Hendrixson et al. in view of Banker (U.S. Patent 3,292,622). Although Banker discloses a power operated device for inoculating persons against various diseases by introducing an inoculant into the skin of a person, Banker does not disclose the device for use with injecting plants, for example, a tree. Accordingly, it is respectfully submitted that Claim 20 is believed to be allowable in view of the cited references.

Specification

The Examiner reminded the Applicant of the proper content of an Abstract of the Disclosure. The Abstract has been amended to recite proper content as suggested by the Examiner.

CONCLUSION

In view of the above amendments and remarks, it is believed that all claims are in condition for allowance, and it is respectfully requested that the application be passed to issue. If the Examiner believes that a telephone conference would expedite prosecution of this case, the Examiner is invited to call the undersigned.

Respectfully submitted,

HAMILTON, BROOK, SMITH & REYNOLDS, P.C.

By



Erik L. Ence

Registration No. 42,511

Telephone: (978) 341-0036

Facsimile: (978) 341-0136

Concord, MA 01742-9133

Dated: July 22, 2002

MARKED UP VERSION OF AMENDMENTSSpecification Amendments Under 37 C.F.R. § 1.121(b)(1)(iii)

Please replace the paragraphs at page 2, line 21 through page 4, line 7 with the following paragraphs:

The invention features a method for injecting a fluid into a woody plant (*e.g.*, a tree (*e.g.*, a dicotyledon, a gymnosperm), a palm tree, a woody vine (*e.g.*, grapevine)), comprising providing (1) a fluid reservoir containing a fluid, (2) a [carrier] gas reservoir containing a [carrier] gas, (3) a needle having a proximal end and a distal end, where the needle comprises (a) an inner conduit, (b) a sealed tip terminating in a point at the distal end, (c) an outer surface, and (d) at least one aperture connecting the inner conduit and the outer surface and proximate to the point at said distal end, (4) an injector connecting the fluid reservoir and the [carrier] gas reservoir to the proximal end of the needle, where the injector can direct at least a portion of the fluid from the fluid reservoir with at least one piston actuated by at least a portion of the [carrier] gas from the [carrier] gas reservoir, through the inner conduit of the needle and out of at least one of the apertures; then inserting the needle into the woody plant, and injecting, via the injector, at least a portion of the fluid from the fluid reservoir [with] using at least a portion of the [carrier gas] from the [carrier] gas reservoir, through the inner conduit of the needle and out of the at least one [of the apertures] aperture and into the woody plant; thereby injecting the fluid into the woody plant. The method can be repeated one or more times on the same woody plant. The fluid can be a treatment for a disease condition, or an insect infestation. The fluid can be a nutrient. The fluid can be aqueous, oleaginous, a suspension, or a combination thereof. The needle can be inserted into expansion tissue. The needle can include two apertures. One or more apertures connecting the inner conduit and the outer surface can be at a forward angle relative to the longitudinal axis of the needle, *e.g.*, the one or more apertures can be at an angle in the range of about 50° and about 130° relative to the longitudinal axis of the needle, or in the range of about 60° and about 120° relative to the longitudinal axis of the needle, or about 65° relative to the longitudinal axis of the needle. At least a portion of the outer surface of the needle

between the point and one of the apertures can include a taper. The needle can have a first portion from the proximal end to a shoulder point, where the outer surface of the first portion can have a first taper, and the needle can also have a second portion from the shoulder point to the distal end, where the second portion can have a second taper which is substantially greater than the first taper. The second taper can have an angle in the range of about 10° and about 50° relative to the longitudinal axis of the needle, or in the range of about 20° and about 40° relative to the longitudinal axis of the needle, or about 30° relative to the longitudinal axis of the needle. At least one of the apertures can be located between the shoulder point and the proximal end.

The invention also features a method for injecting a medicament (*e.g.*, a fertilizer, a pesticide, a fungicide, a growth regulator and a hormone) into a plant, comprising providing a medicament for a plant, [mixing the medicament with] providing a compressed [carrier] gas (*e.g.*, carbon dioxide, air, nitrogen) for injecting the medicament into the plant, and [directing the] injecting, by motion of at least one piston actuated by at least a portion of the compressed gas, medicament [and compressed carrier gas] through [the] a surface of [a] the plant to inject the medicament into the plant. As a propellant, air is frequently divided into three basic categories: (1) low pressure air ("LPA"), which is generally less than 1,207 kiloPascals (175 pounds per square inch), medium pressure air ("MPA"), which is generally 1,207 - 2,586 kiloPascals (175 - 375 pounds per square inch), and high pressure air ("HPA"), which is generally greater than 2,586 kiloPascals (375 pounds per square inch).

Please replace the paragraph at page 4, line 9 through page 5, line 7 with the following paragraph:

In another aspect, the invention features an apparatus for injecting a fluid into a woody plant (*e.g.*, a tree (*e.g.*, a dicotyledon, a gymnosperm), a palm tree, a woody vine (*e.g.*, grapevine)), comprising, (a) a fluid reservoir containing a fluid, (b) a [carrier] gas reservoir containing a [carrier] gas, (c) a needle having a proximal end and a distal end, comprising (i) an inner conduit, (ii) a sealed tip terminating in a point at the distal end, (iii) an outer surface, and (iv) at least one aperture connecting the inner conduit and the outer surface and proximate to the point at said distal end and (c) an injector connecting the fluid reservoir and the [carrier] gas reservoir [to the proximal end of the needle], wherein the injector can direct at least a portion of the fluid from the fluid reservoir with

at least one piston actuated by at least a portion of the [carrier] gas from the [carrier] gas reservoir, through the inner conduit of the needle and out of the at least one [of the apertures] aperture. The fluid can be a treatment for a disease condition, or an insect infestation. The fluid can be a nutrient. The fluid can be aqueous, oleaginous, a suspension, or a combination thereof. The needle can include two apertures. One or more apertures connecting the inner conduit and the outer surface can be at a forward angle relative to the longitudinal axis of the needle, *e.g.*, the one or more apertures can be at an angle in the range of about 50° and about 130° relative to the longitudinal axis of the needle, or in the range of about 60° and about 120° relative to the longitudinal axis of the needle, or about 65° relative to the longitudinal axis of the needle. At least a portion of the outer surface of the needle between the point and one of the apertures can include a taper. The needle can have a first portion from the proximal end to a shoulder point, where the outer surface of the first portion can have a first taper, and the needle can also have a second portion from the shoulder point to the distal end, where the second portion can have a second taper which is substantially greater than the first taper. The second taper can have an angle in the range of about 10° and about 50° relative to the longitudinal axis of the needle, or in the range of about 20° and about 40° relative to the longitudinal axis of the needle, or about 30° relative to the longitudinal axis of the needle. At least one of the apertures can be located between the shoulder point and the proximal end.

Please replace the paragraph at page 8, lines 13 through 18 with the following paragraph:

In one embodiment, the apparatus comprises a needle, a fluid reservoir which holds the fluid to be injected into the plant, and a [carrier] gas reservoir which holds a [carrier] gas. The [carrier] gas is used to propel the fluid through the needle and into the plant. The [carrier] gas can [be any inert gas, *i.e.*, a gas which does not react with the fluid or the medicaments dissolved or suspended in the fluid. Such gases can] include, but [are] is not limited to, carbon dioxide and nitrogen.

Please replace the paragraph at page 11, line 23 through page 12, line 5 with the following paragraph:

In another embodiment, shown in Fig. 6, the [carrier] gas is introduced into the HPA inlet port 101, shuttled into the power piston 125 via the shuttle valve 115 by depressing the trigger 110. The shot size is set by the shot size adjustment knob 120, which limits the return travel of the power piston 125. Once the power piston 125 is actuated, it pushes the injector rod 130, closing the inlet check valve 140 and opening the outlet check valve 145 at a set pressure that is adjustable via spring selection. When the trigger 110 is released, the shuttle valve 115 closes to HPA and opens to the HPA exhaust position 105 and the power piston 125 is allowed to return to the shot start set point. This draws back the injector rod 130, closing the outlet check valve 145 and opening the inlet check valve 140 to receive whatever positive pressure fluid is available at inlet port 135. As the pressure created by the outlet check valve 145 spring is still collapsing in the injection needle 150, there is no fluid "suck back".

Please replace the paragraph at page 13, lines 11-15 with the following paragraph:

Once the tip of the needle is placed at a satisfactory location for injection, the apparatus is triggered, and at least a portion of the fluid from the fluid reservoir is pushed with at least a portion of the [carrier] gas from the [carrier] gas reservoir, into the proximal end of the needle, through the inner conduit of the needle, and out of at least one of the aperture(s), and into the plant.

Please replace the paragraph at page 14, lines 6-7 with the following paragraph:

After treatment, the plant should be watered thoroughly, *e.g.*, 2.54 cm (1 inch) of irrigation in the root zone, to ensure distribution of the [medicamtn] medicament throughout the plant.

Please replace the paragraph at page 16, lines 14-24 with the following paragraph:

Other suitable injection compositions include botanical and herbal products, *e.g.*, organic plant extracts specifically formulated to increase natural plant defense mechanisms, to be used as prophylaxis or deterrents to infestation and/or infection by pests. Such compositions include, but are not limited to, extracts of *Allium* (*e.g.*, *A. cepa* (onion) and/or *A. sativum* (garlic); as prophylaxis, to



enhance plant defenses against infection, as natural [sufonated] sulfonated compounds reduce susceptibility to infection), *Capsicum* (*C. annuum* (hot pepper); as prophylaxis, as such extracts reduce plant desirability as a food source), and *Lycopersicon* (*L. esculentum* (tomato); enhances plant resistance to infestation). Other compositions include biocontrols, *e.g.*, injection of predatory nematodes into cavities, to control plant borers, *e.g.*, red palm weevil, Asian long horned beetle, etc.

Please replace the paragraph at page 17, lines 8-11 with the following paragraph:

The invention can also be used to kill plants by application of poison, *e.g.*, to kill invasive species in locations where [machanical] mechanical culling is not possible (*e.g.*, in remote or inaccessible areas) or ineffective (*e.g.*, in plants that produce new shoots from stumps or roots).

Please replace the Abstract at page 27 with the following Abstract:

A method for injecting fluid into woody plant is disclosed, and apparatus therefor, for delivering disease treatment and nutritional supplements. In one embodiment, the apparatus includes a fluid reservoir containing a fluid, a gas reservoir containing a gas, a needle having a proximal and a distal end, and an injector connectable to the fluid reservoir and the gas reservoir. The injector can direct at least a portion of the fluid from the fluid reservoir with at least one piston actuated by at least a portion of the gas from the gas reservoir through an inner conduit of the needle and out of the at least one aperture. A method for injecting the medicament includes providing a medicament for the plant, providing a compressed gas for injecting the medicament into the plant, and injecting, by motion of at least one piston actuated by at least a portion of the compressed gas, medicament through a surface of the plant to inject the same.

Claim Amendments Under 37 C.F.R. § 1.121(c)(1)(ii)

1. (Amended) A method for injecting a fluid into a woody plant, the method comprising:
  - (a) providing:

- (i) a fluid reservoir containing a fluid;
  - (ii) a [carrier] gas reservoir containing a [carrier] gas;
  - (iii) a needle having a proximal end and a distal end, comprising:
    - (1) an inner conduit;
    - (2) a sealed tip terminating in a point at the distal end;
    - (3) an outer surface; and
    - (4) at least one aperture connecting the inner conduit and the outer surface and proximate to the point at said distal end; and
  - (iv) an injector [connecting] connectable to the fluid reservoir and the [carrier] gas reservoir [to the proximal end of the needle], wherein the injector can direct at least a portion of the fluid from the fluid reservoir with at least one piston actuated by at least a portion of the [carrier] gas from the [carrier] gas reservoir, through the inner conduit of the needle and out of the at least one [of the apertures] aperture;
  - (b) inserting the needle into the woody plant; and
  - (c) injecting, via the injector, at least a portion of the fluid from the fluid reservoir [with] using at least a portion of the [carrier] gas from the [carrier] gas reservoir, through the inner conduit of the needle and out of the at least one [of the apertures] aperture and into the woody plant; thereby injecting the fluid into the woody plant.
11. (Amended) The method of Claim 1, wherein the at least one [or more apertures] aperture connecting the inner conduit and the outer surface [are] is at a forward angle relative to the longitudinal axis of the needle.
12. (Amended) The method of Claim 11, wherein the at least one [or more apertures are] aperture is at an angle of about 50° to about 130° relative to the longitudinal axis of the needle.

13. (Amended) The method of Claim 12, wherein the at least one [or more apertures are] aperture is at an angle of about 60° to about 120° relative to the longitudinal axis of the needle.
14. (Amended) The method of Claim 12, wherein the at least one [or more apertures are] aperture is at an angle of about 65° relative to the longitudinal axis of the needle.
15. (Amended) The method of Claim 1, wherein at least a portion of the outer surface of the needle between the point and the at least one [of the apertures] aperture includes a taper.
18. (Amended) A method for injecting a medicament into a plant comprising:
  - (a) providing a medicament for [a] the plant;
  - (b) [mixing said medicament with] providing a compressed [carrier] gas for injecting the medicament into the plant; and
  - (c) injecting, by motion of at least one piston actuated by at least a portion of the compressed gas, [directing said] medicament [and compressed carrier gas] through [the] a surface of [a] the plant to inject said medicament into the plant.
20. (Amended) The method of Claim 18 wherein said [carrier] gas is selected from the group consisting of: carbon dioxide, air, nitrogen.
21. (Amended) An apparatus for injecting a fluid into a woody plant, the apparatus comprising:
  - (a) a fluid reservoir containing a fluid;
  - (b) a [carrier] gas reservoir containing a [carrier] gas;
  - (c) a needle having a proximal end and a distal end, comprising:
    - (i) an inner conduit;
    - (ii) a sealed tip terminating in a point at the distal end;
    - (iii) an outer surface; and
    - (iv) at least one aperture connecting the inner conduit and the outer surface and proximate to the point at said distal end; and

- (c) an injector [connecting] connectable to the fluid reservoir and the [carrier] gas reservoir [to the proximal end of the needle], wherein the injector can direct at least a portion of the fluid from the fluid reservoir with at least one piston actuated by at least a portion of the [carrier] gas from the [carrier] gas reservoir, through the inner conduit of the needle and out of the at least one [of the apertures] aperture to inject the fluid into the woody plant.
29. (Amended) The apparatus of Claim 21, wherein the at least one [or more apertures] aperture connecting the inner conduit and the outer surface [are] is at a forward angle relative to the longitudinal axis of the needle.
30. (Amended) The apparatus of Claim 29, wherein the at least one [or more apertures are] aperture is at an angle of about 50° to about 130° relative to the longitudinal axis of the needle.
31. (Amended) The apparatus of Claim [33] 21, wherein the needle has a first portion from the proximal end to a shoulder point, wherein said outer surface of said first portion has a first taper, and a second portion from the shoulder point to the distal end, wherein said second portion has a second taper which is substantially greater than the first taper.
33. (Amended) The apparatus of Claim 31, wherein the at least one [of the apertures] aperture is located between the shoulder point and the proximal end.